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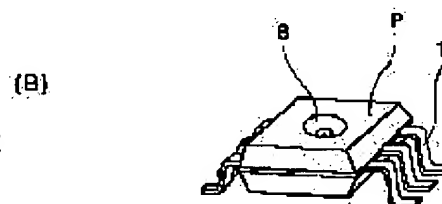
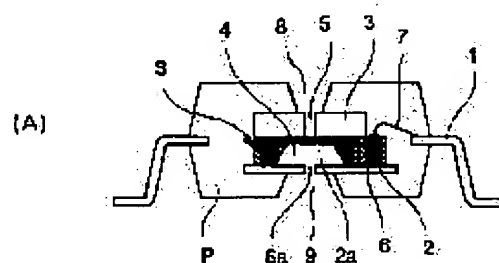
(72)Inventor : KAWAKAMI KENTA

(54) STRUCTURE AND METHOD FOR PACKAGING OF CAPACITIVE PRESSURE SENSOR

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a packaging structure, for a capacitive pressure sensor, which is small, whose environment-resistant property is good and whose production costs are low.

SOLUTION: A sensor body S as a whole is mold-molded together with a lead frame 1 so as to be buried in a resin package P. A surface pressure guiding part 8 which is formed by a core pin is formed on the surface side of the resin package P, and it communicates with a pressure guiding small hole 5 in the sensor body S. A rear-surface pressure guiding part 9 which is formed by a core pin is formed on the rear surface side of the resin package P, it communicates with a pressure guiding hole 6a and a pressure guiding window 4 on the rear surface of the sensor body S.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the packaging structure and the packaging method of carrying out the resin mould of the main part of a sensor especially about the electrostatic-capacity type pressure sensor used for various kinds of devices containing a pressure detection system, such as a sphygmomanometer, and a gas meter or a safe valve gear.

[0002]

[Description of the Prior Art] Conventionally, there is a very small electrostatic-capacity type pressure sensor with the following structures. This carries out the fabricating operation of the semiconductor substrates, such as silicon, using a semiconductor-device manufacturing technology or a micromachining technology, and builds the small chip which really formed the diaphragm of closing in within the limit of the thick housing section. This chip is called pressure-sensitive chip and it joins combining this and insulating substrates, such as glass. At this time, it sets up so that the diaphragm of a pressure-sensitive chip and the front face of an insulating substrate may set a very small interval and may counter. Furthermore, the movable electrode is carried out at the diaphragm and thin film formation of the fixed electrode is carried out at the insulating substrate, respectively.

[0003] If a sensor capacitor is formed, a pressure acts on a diaphragm and the aforementioned interval changes with the movable electrodes and fixed electrodes which set a small interval and counter by this, the capacity between two electrodes will change. This is a sensor output. The pressure-sensitive chip was built with electrical conducting materials, such as contest polysilicon, and the type with which the diaphragm itself serves as a movable electrode was also developed.

[0004] The main part of the electrostatic-capacity type pressure sensor which consisted of a pressure-sensitive chip and an insulating substrate as mentioned above is a square shape heavy-gage board with the overall small envelopment configuration, ***** is carrying out opening to both the upper surfaces and the inferior surfaces of tongue of a main part, and a pressure acts on an internal diaphragm through the ***** [both / one side or] Here, since the diaphragm is peeping into the pressure-sensitive chip side within the limit of the aforementioned housing section, this within the limit space is big ***** (this is also called *****). In addition, small ***** is made in the aforementioned insulating substrate (this is also called ***** pinhole), and there is also a type in which enabled it to make a pressure act also on the field of the opposite side of a diaphragm from the exterior through here.

[0005] Since there is various inconvenience by the component side with the main part of a sensor of the above simple structures, usually this is mounted with the gestalt contained in the suitable package.

[0006] The package of the product made of a resin or metal is manufactured separately (the leadframe is attached), and in it, the aforementioned main part of a sensor is contained, and it fixes with adhesives etc., and the packaging structure of the conventional electrostatic-capacity type pressure sensor is carrying out wire bonding of the bonding area of the main part of a sensor, and the leadframe of a package inside the package. Of course, there is a path for introducing the pressure for detection in the main part of a sensor from the exterior in a package.

[0007]

[Problem(s) to be Solved by the Invention] With the conventional packaging structure mentioned above, in order to manufacture separately the package of the product made of a resin, or metal, it becomes cost quantity fairly, and it becomes cost quantity also for the assembly operation which contains the main part of a sensor in a package. Moreover, with the structure which contains the main part of a sensor in the package manufactured separately, the size margin about considerable needed to be given among both, for the reason, the dimension of the sensor after packaging became large, and there was a problem that a miniaturization was difficult. Furthermore, there are a bonding wire which has connected the main part of a sensor and the leadframe inside a package, and a problem that a resistance to environment becomes bad since it will be wide opened inside a package in the air by the main part of a sensor itself.

[0008] The place which this invention was made in view of the above-mentioned background, and is made into the purpose solves the above-mentioned problem, is small, and is to offer the packaging structure of an electrostatic-capacity type pressure sensor with a cheap manufacturing cost, and the packaging method with a sufficient resistance to environment.

[0009]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the packaging structure of invention according to claim 1 is equipped with each following requirement (1) - (3).

(1) The main part of a sensor is a heavy-gage board with the overall small envelopment configuration, ***** is carrying out opening to both the upper surfaces and the inferior surfaces of tongue of a main part, and a pressure acts on an internal diaphragm through the ***** [both / one side or]

(2) The leadframe for external wiring is combined with the aforementioned main part of a sensor, the bonding area and the leadframe concerned of the aforementioned main part of a sensor are connected, the resin mould of the aforementioned whole main part of a sensor and a part of aforementioned leadframe is carried out also including a part for this connection, and the amount of [of the aforementioned leadframe] point has projected from the resin package.

(3) ***** which is open for free passage to the aforementioned ***** of the aforementioned main part of a sensor is formed in both the upper surfaces and the inferior surfaces of tongue of the aforementioned resin package. [both / one side or]

[0010] these after positioning the aforementioned main part of a sensor, joining and connecting the aforementioned bonding area and the aforementioned leadframe in manufacturing the electrostatic-capacity type pressure sensor of the aforementioned packaging structure by the packaging method according to claim 2 on the metal plate which is following the aforementioned leadframe by the periphery -- insert molding -- it sets to metal mold, the aforementioned resin mould is performed, and the aforementioned resin package containing the aforementioned ***** is really fabricated

[0011] In this packaging method, the method of joining to a field with the aforementioned ***** which the aforementioned main part of a sensor is large, and carried out opening of the aforementioned metal plate, and forming ***** smaller enough than ***** with the aforementioned big main part of a sensor in the aforementioned metal plate can be taken (invention according to claim 3). Furthermore, in addition to joining the aforementioned main part of a sensor on the aforementioned metal plate, after joining the 2nd metal plate on the aforementioned main part of a sensor, the method of progressing to the aforementioned resin mould process can also be taken (invention according to claim 4). In this case, the method of joining to the field which forms small ***** in the 2nd metal plate of the above, and has the aforementioned big ***** of the aforementioned main part of a sensor in the 2nd metal plate of the above can also be taken (invention according to claim 5).

[0012] Moreover, in the aforementioned packaging structure, the aforementioned ***** of the aforementioned resin package can adopt suitably the structure (invention according to claim 6) which projects in the shape of a pipe and is formed toward the outside, and the structure where the pipe is connected with the outside of the aforementioned ***** of the aforementioned resin package (invention according to claim 7).

[0013] Moreover, the packaging structure of the electrostatic-capacity type pressure sensor of invention according to claim 8 is equipped with each following requirement (1) - (3).

(1) The main part of a sensor is a heavy-gage board with the overall small envelopment configuration, ***** is carrying out opening to both the upper surfaces and the inferior surfaces of tongue of a main part, and a pressure acts on an internal diaphragm through the ***** [both / one side or]

(2) While the aforementioned main part of a sensor is carried on the patchboard of a bigger size than this, the bonding area and the aforementioned patchboard of the aforementioned main part of a sensor are connected, and, on the whole, the resin mould of the aforementioned main part of a sensor is carried out on the aforementioned patchboard also including a part for this connection.

(3) ***** which is open for free passage to the aforementioned ***** of the aforementioned main part of a sensor is formed in both [both / one side or] the resin package formed of the aforementioned mould, and the aforementioned patchboard.

[0014] By this invention, the mould of the great portion of circumference of the main part of a sensor is carried out with a resin package. Since the resin mould of the bonding wire which connects electrically the main part of a sensor, a leadframe, and them, and also the bonding area of the bonding wire is carried out at this time, a possibility of carrying out open circuit, corrosion, etc. decreases as much as possible, and becomes strong to a resistance to environment.

[0015] Moreover, since the main part of a sensor, a leadframe, etc. are simultaneously fixable, while inserting the main part of a sensor into the box-like package formed separately like before, compared with the process which carries out adhesion fixation, it can carry out easily. And the space for securing the margin at the time of inserting into the conventional package becomes unnecessary, and a small thing is manufactured.

[0016] Moreover, although the processing which covers the main part of a sensor a box-like package in the conventional thing, covers its package after supply fixation, and is closed was required, the starting operation not only becomes unnecessary, but airtightness is certainly securable in the case of a resin package.

[0017] Furthermore, in the thing of the type which joined the metal plate to the pressure-sensitive tip side, in case the upper part of big ***** formed in a pressure-sensitive chip can be covered with a metal plate and carries out a resin mould, a metal plate prevents that the resin invades in a pressure-sensitive chip. Therefore, an effective-area product can be made small and the fall and injury on detection precision accompanying the invasion of foreign matters, such as dust, can be inhibited. And a metal plate also makes a role of a base which equips with the main part of a sensor in the case of an automatic manufacturing process. Thus, curtailment of the part mark used as a result can be aimed at by making two functions make it serve a double purpose.

[0018]

[Embodiments of the Invention]

[Gestalt of whole mould type implementation] drawing 1 (A) and (B) show an example of the gestalt of operation of the packaging structure concerning this invention. As shown in this drawing, mould fabrication is carried out so that the whole main part S of a sensor may be embedded in the resin package P. And as shown in this drawing (B), the mould is carried out to the resin package P so that the base of six leadframes 1 may be embedded. Moreover, a leadframe 1 is divided [three] into right and left, and is arranged in them. [each] In addition, two of six leadframes 1 are the effective lead electrically connected with the main part S of a sensor, and four are the leadframe of an invalid dummy electrically [others]. In the following explanation, the effective lead of two for signal ejection and especially the lead of a dummy are not distinguished.

[0019] The component parts with the main main part S of a sensor are the pressure-sensitive chip 2 and an insulating substrate 3. The pressure-sensitive chip 2 is a small chip which carried out the fabricating operation of the semiconductor substrates, such as silicon, using the semiconductor-device manufacturing technology or the micromachining technology, and really formed diaphragm 2a of closing in within the limit of the thick housing section. It joins combining this pressure-sensitive chip 2 and the insulating substrates 3, such as glass.

[0020] Thereby, diaphragm 2a of the pressure-sensitive chip 2 and the front face of an insulating substrate 3 set a very small interval, and counter. And a sensor capacitor is formed of the movable

electrode and fixed electrode which set a small interval and counter by carrying out the movable electrode at diaphragm 2a, and carrying out thin film formation of the fixed electrode at the insulating substrate 3, respectively. Therefore, if a pressure acts on diaphragm 2a and the aforementioned interval changes, the capacity between two electrodes will change. This is a sensor output.

[0021] The main part S of the electrostatic-capacity type pressure sensor which consisted of a pressure-sensitive chip 2 and an insulating substrate 3 is a square shape heavy-gage board with the overall small envelopment configuration. By the main part S of a sensor of the gestalt of this operation, ***** is carrying out opening to both the upper surface and inferior surface of tongue, and the pressure led to both sides of internal diaphragm 2a from the outside through the ***** acts. Here, since diaphragm 2a is peeping into the pressure-sensitive chip 2 side within the limit of the aforementioned housing section, this within the limit space is big ***** (this is called ***** 4). In addition, small ***** is made in the aforementioned insulating substrate 3 (this is called ***** pinhole 5), and the pressure led also to the field of the opposite side of diaphragm 2a from the outside through here can be made to act. This type is called double-sided ***** type (there is also an one side ***** type to this).

[0022] The main part S of a sensor by which the mould is carried out to the resin package P is joined on the metal plate 6 with which the stage with a manufacture process was following each leadframe 1 by the periphery. Small ***** 6a is formed in the center of this metal plate 6, the pressure-sensitive chip 2 side of the main part S of a sensor is joined on this, and big ***** 4 of the pressure-sensitive chip 2 is narrowed by small ***** 6a of a metal plate 6.

[0023] Drawing 2 - drawing 5 show the example which manufactures the structure shown in drawing 1 as an example of the gestalt of operation of the packaging method concerning this invention. First, the carrier-part article with which the leadframe 1 followed the metal plate 6 as shown in drawing 2 is prepared. And on the metal plate 6 of this carrier-part article, the main part S of a sensor is positioned and it joins. Next, wire bonding of the leadframe 1 in the circumference of a metal plate 6 and the bonding area of the main part S of a sensor is carried out through a bonding wire 7, and it connects electrically (refer to drawing 3). The whole is conveyed with a carrier-part article in the state, and it goes to a resin mould fabrication station.

[0024] The situation of processing at a forming station is shown in drawing 3 - drawing 5 . The punch 80 and female mold 90 of an insert molding machine are here, and, thereby, the resin package P is fabricated. The punch 80 is equipped with the core pin 81 of working for forming upper surface ***** 8 of the resin package P. Female mold 90 is equipped with the core pin 91 of working for forming inferior-surface-of-tongue ***** 9 of the resin package P.

[0025] Specifically, on the metal plate 6 of the carrier-part article of drawing 2 , like drawing 3 , what joined the main part S of a sensor is conveyed in the mold of an insert molding machine, and is positioned, and it carries out [mold-clamp] like drawing 4 , and a part for the leadframe 1 of a carrier-part article or a periphery is put by the punch 80 and female mold 90, and it fixes. Moreover, simultaneously, the core pin 81 of a punch 80 and the core pin 91 of female mold 90 slide, respectively, it advances into a mold, the ***** pinhole 5 in which the nose of cam of a core pin 81 carried out opening to the upper surface of the main part S of a sensor is closed, and ***** 6a in which the nose of cam of a core pin 91 carried out opening to the metal plate 6 of the inferior surface of tongue of the main part S of a sensor is closed. A resin is filled up with this state in a mold like drawing 5 .

[0026] It will unmold, if a resin hardens, and next, the periphery of the carrier-part article of drawing 2 is separated with a press machine. If it does so, the electrostatic-capacity type pressure sensor which is shown in drawing 1 (A) and (B) and which carried out packaging will be completed. Here, upper surface ***** 8 built by the core pin 81 is formed in the upper surface side of the resin package P, and it is open for free passage with the ***** pinhole 5 of the main part S of a sensor. Moreover, inferior-surface-of-tongue ***** 9 built by the core pin 91 is formed in the inferior-surface-of-tongue side of the resin package P, and it is open for free passage with *****6a of the inferior surface of tongue of the main part S of a sensor, and ***** 4. It becomes the packaging product of the electrostatic-capacity type pressure sensor of the double-sided ***** type on which the pressure led to both sides of diaphragm 2a from the outside is made to act now.

[0027] Moreover, in this example, since the metal plate 6 was joined to the pressure-sensitive chip 2 side, ***** 4 greatly opened to the upper surface of the pressure-sensitive chip is blockaded mostly. Consequently, when a resin mould is carried out, the upper part of the ***** 4 can be covered with the resin package P. That is, a part for opening can be made small infinite and it can suppress that dust etc. invades in ***** 4 as much as possible. That is, a metal plate 6 has a function for attaching the main part S of a sensor, and has the function which suppresses the effective-area product by the side of the pressure-sensitive chip 2 as much as possible by the sensor module after manufacture at a manufacturing process.

[0028] [Whole mould type modification] drawing 6 - drawing 10 are the modifications of the whole mould type shown in drawing 1. When it explains according to each drawing, drawing 6 is the example which projected on the undersurface of the resin package P in one, formed pipe section 9a in it, and formed pipe-like ***** 9 in the form of operation of drawing 1. If it is made the starting composition, since the pipe section 9a will become wearing portions, such as a tube hose for supplying the pressure of the measuring object, anchoring becomes easy. In addition, in order to make it the applied configuration, it can respond by changing the configuration of female mold 90 shown in drawing 3 - drawing 5.

[0029] Moreover, in the form of operation of drawing 1, drawing 7 is the example which connected pipe 9b separately formed in the ***** 9 while forming undersurface ***** 9 of the resin package P somewhat more greatly. And in order to secure airtightness, O ring 15 is made to intervene. Adhesives can be used instead of O ring 15, and airtightness can also be secured.

[0030] ** [comparison of each drawings which correspond to drawing 1, drawing 6, and drawing 7, respectively, and correspond of the form of operation shown in drawing 8 - drawing 10 / reverse / the sense of the upper and lower sides of the main part S of a sensor mounted in the interior of the resin package P / so that clearly / it]

[0031] In addition, although it differs in a configuration partially with the thing of the structure shown in drawing 1 also by the thing of the structure shown in above-mentioned drawing 6 - drawing 10, the fundamental functions and operation effects other than the above-mentioned explanation are the same as that of the thing of drawing 1, the same sign is attached, and the detailed explanation is omitted.

[0032] In addition, in the thing of the form of each operation shown in drawing 1, drawing 6, and drawing 7, it becomes equivalent to what made reverse the direction which a leadframe 1 bends so that each drawing of drawing 8 - drawing 10 may be conversely understood for the upper and lower sides again. Therefore, what is necessary is for a fundamental manufacturing process to be the same as that of the process which manufactures the package structure shown in drawing 1, drawing 6, and drawing 7, and just to bend to an opposite direction in the case of the process which bends a leadframe 1, in order to manufacture each sensor shown in drawing 8 - drawing 10.

[0033] Furthermore, although illustration is excluded, it can be made into the configuration where the pipe sections 9a and 8a shown in drawing 6, drawing 7, drawing 9, and drawing 10, or 9b and 8b were prepared in the upper surface and the undersurface.

[0034] Although the form of each operation which carried out the [form of one side **** type implementation] above explained the type (usually while type which carries out atmospheric pressure opening, supplies a measuring object pressure to another side, and asks for the pressure to atmospheric pressure) on which the pressure led to both sides of diaphragm 2a from the outside acts this invention cannot be restricted to this, a measuring object pressure can be applied only to one side of diaphragm 2a, and another side can also be applied about the one side **** type which measures the absolute pressure it was made to blockade. If an example is shown, it can consider as structure like drawing 11.

[0035] That is, the package structure shown in drawing 11 (A) is the structure which lost the **** pinhole 5 of the insulating substrate 3 in the main part S of a sensor, and also lost upper surface ***** 8 of the resin package P in the form of operation shown in drawing 1. That is, an insulating-substrate 3 side is blockaded and it is made to supply the measuring pressure force from the pressure-sensitive chip 2 side.

[0036] Moreover, drawing 11 (B) is taken as the composition which lost ***** 6a of the metal plate 6 of the undersurface of the main part S of a sensor, and also lost undersurface ***** of the resin

package P in the form of operation of drawing 1 contrary to this drawing (A). That is, it is made to supply the measuring pressure force from an insulating-substrate 3 side.

[0037] Furthermore, by what was illustrated, since the pressure-sensitive chip 2 is joined to the metal plate 6 and a metal plate 6 serves as two functions as the double-sided **** type example explained, this type of thing can also attain communalization of parts, and can aim at curtailment of part mark.

[0038] In case this invention is not restricted to this and joins the main part S of a sensor to the metal substrate 6, you may make an insulating-substrate 3 side contact the metal substrate 6 with the form of each operation which carried out the [form of vertical reverse arrangement type implementation] above, although each contacted and was made to join the pressure-sensitive chip 2 at a metal plate 6.

[0039] If an example is shown, in the form of operation of drawing 1, it can consider as the structure shown in drawing 12 (A) by considering the main part S of a sensor as arrangement of vertical reverse to a metal plate 6, turning an insulating-substrate 3 side down, and joining to a metal plate 6. Moreover, it can consider as the structure [as] shown in drawing 12 (B) by changing the direction which bends a leadframe 1 to the form of operation of drawing 12 (A) like the form of operation shown in drawing 8.

[0040] If it is made the starting composition, the area by the side of an insulating substrate 3 can be taken greatly, and a circuit pattern and an electrode pad can be easily formed in the front face of an insulating substrate 3 by vacuum evaporation, the spatter, etc.

[0041] In addition, although concrete illustration is omitted, vertical reverse arrangement type composition can be taken like [form / of operation of drawing 6, drawing 7, drawing 9 - drawing 11] the above. Moreover, in drawing 12, it is good also as composition which lost *****6a of the metal plate 6 of the undersurface of the main part S of a sensor, and the **** pinhole 5 of an insulating substrate 3, and lost undersurface ***** 9 of the resin package P. This becomes the vertical reverse arrangement structure of the one side **** type which supplied the measuring pressure force only from the pressure-sensitive chip 2 side.

[0042] On the other hand, with the form of operation shown in drawing 13, the 2nd metal plate 10 is joined after the pressure-sensitive chip 2 of the main part S of a sensor in the form of operation of drawing 12 (A). And small ***** 10a has opened in the center of the 2nd metal plate 10, and the structure which is narrowing big ***** 4 of the pressure-sensitive chip 2 by this is taken. By taking the starting composition, it can prevent that the upper part of the pressure-sensitive chip 2 is wide opened greatly by ***** 4.

[0043] With the form of [form of single-sided mould type implementation] book operation, as first shown in drawing 14, the main part S of a sensor of the same composition as the form of operation of drawing 1 is joined on the printed wired board 11 of a big size. ***** 11a has opened in the patchboard 11, and this hole is open for free passage to ***** 4 of the undersurface of the main part S of a sensor. The bonding area and patchboard 11 of the main part S of a sensor are connected by the bonding wire 13. Moreover, a leadframe 14 can be attached to a patchboard 11. A GARAEO substrate can be used for this patchboard 11, or a ceramic substrate can be used for it.

[0044] Next, as shown in drawing 15, the patchboard 11 which mounted the main part S of a sensor is set between the punch 80 of an insert molding machine, and female mold 90. If there is a core pin 81 and it carries out [mold-clamp] to a punch 80 at this time, the nose of cam of a core pin 81 will close the **** pinhole 5 of the upper surface of the main part S of a sensor.

[0045] When the resin was filled up with this state in the mold and having been unmolded after hardening, as shown in drawing 16, the main part S of a sensor mounted in the patchboard 11 carried out the mould with the resin package P also including the bonding wire 13. Here, upper surface ***** 8 built by the core pin 81 is formed in the upper surface side of the resin package P, and it is open for free passage with the **** pinhole 5 of the main part S of a sensor.

[0046]

[Effect of the Invention] Since the resin mould of the part for the bonding area incidental to the main part of a sensor and this is carried out according to this invention, a resistance to environment improves. Moreover, by this invention, although predetermined space is conventionally formed between the circumference of the main part of a sensor, and the package, since the starting space becomes

unnecessary, the whole electrostatic-capacity type pressure sensor also including the resin package by the mould can be miniaturized conventionally. Moreover, since this kind of the packaging method is a method which spread through manufacture of a semiconductor device etc. widely, it can also utilize the manufacturing facility and manufacture know-how cheaply, therefore can manufacture cheaply the electrostatic-capacity type pressure sensor of this invention.

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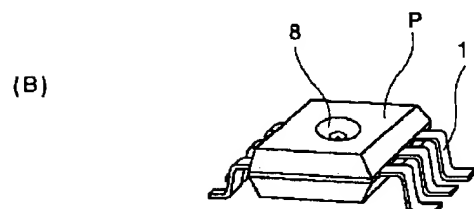
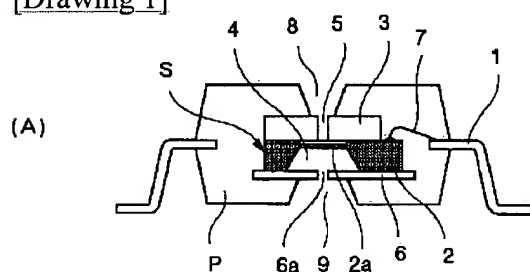
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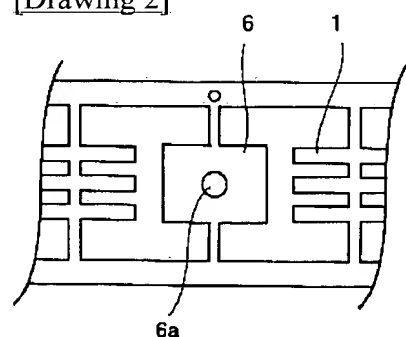
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DRAWINGS

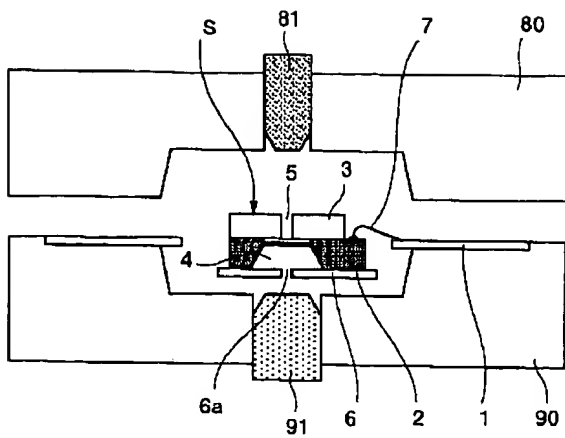
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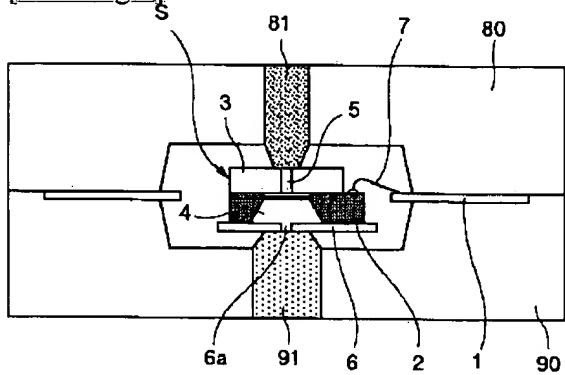
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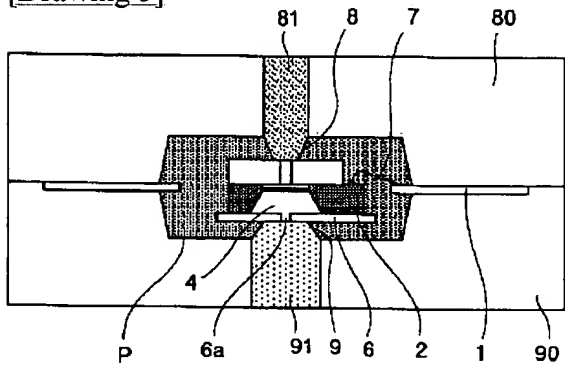
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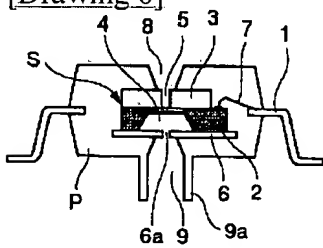
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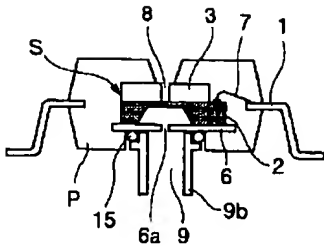
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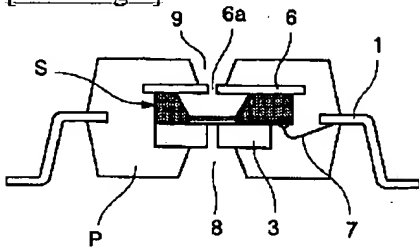
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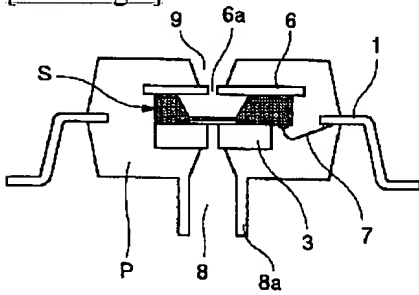
[Drawing 7]



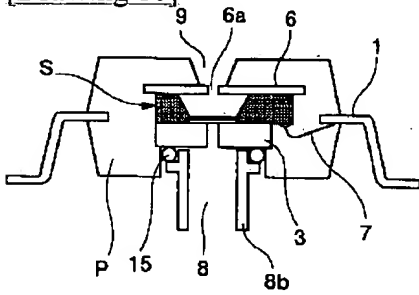
[Drawing 8]



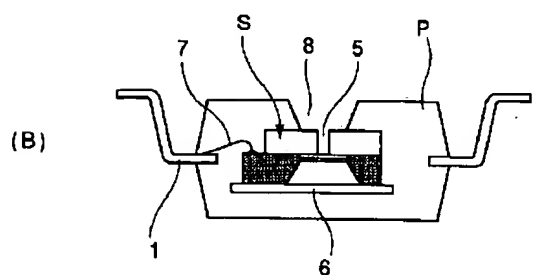
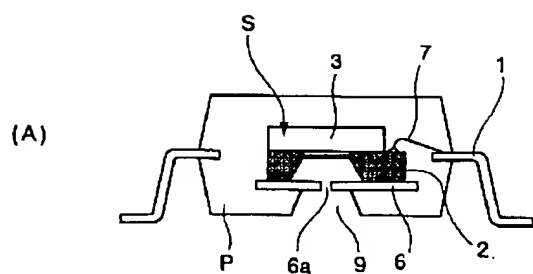
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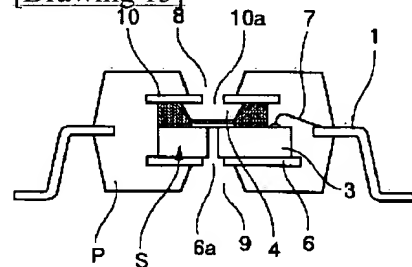
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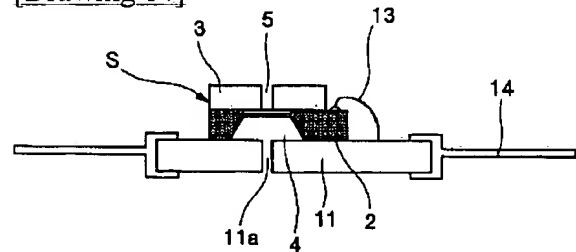
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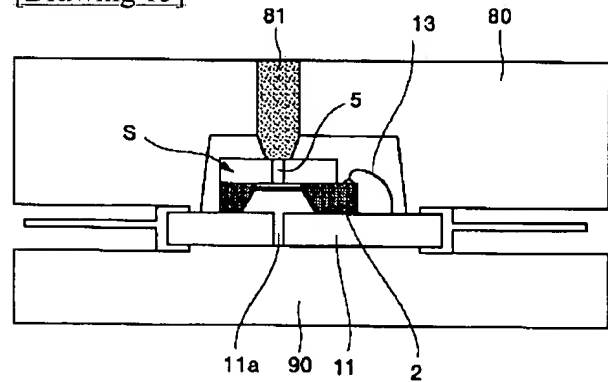
[Drawing 13]



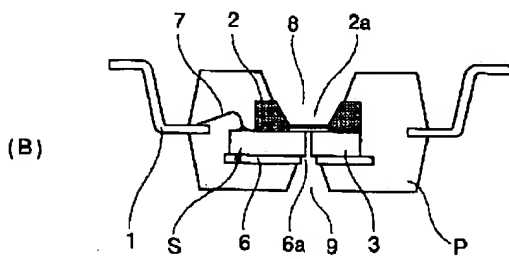
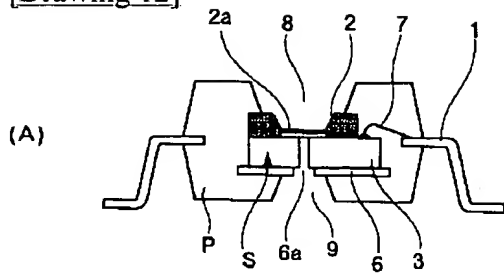
[Drawing 14]



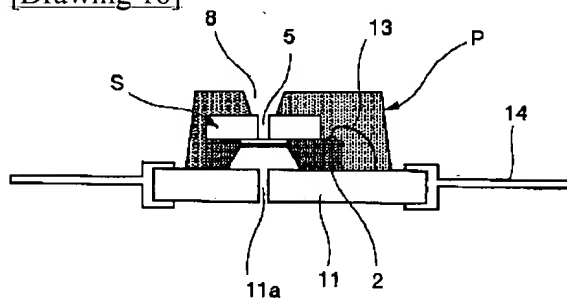
[Drawing 15]



[Drawing 12]



[Drawing 16]



[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing an example of the gestalt of operation of a whole mould type electrostatic-capacity type pressure sensor.

[Drawing 2] It is the plan of the carrier-part article with which the leadframe and the metal plate are continuing.

[Drawing 3] It is the manufacturing process view showing an example of the packaging method of a whole mould type electrostatic-capacity type pressure sensor.

[Drawing 4] It is the manufacturing process view showing an example of the packaging method of a whole mould type electrostatic-capacity type pressure sensor.

[Drawing 5] It is the manufacturing process view showing an example of the packaging method of a whole mould type electrostatic-capacity type pressure sensor.

[Drawing 6] It is the block diagram showing an example of the gestalt of operation of a whole mould type electrostatic-capacity type pressure sensor.

[Drawing 7] It is the block diagram showing an example of the gestalt of operation of a whole mould type electrostatic-capacity type pressure sensor.

[Drawing 8] It is the block diagram showing an example of the gestalt of operation of a whole mould type electrostatic-capacity type pressure sensor.

[Drawing 9] It is the block diagram showing an example of the gestalt of operation of a whole mould type electrostatic-capacity type pressure sensor.

[Drawing 10] It is the block diagram showing an example of the gestalt of operation of a whole mould type electrostatic-capacity type pressure sensor.

[Drawing 11] It is the block diagram showing the gestalt of operation of an one side **** type electrostatic-capacity type pressure sensor.

[Drawing 12] It is the block diagram showing the gestalt of operation of a vertical reverse arrangement type electrostatic-capacity type pressure sensor.

[Drawing 13] It is the block diagram showing the gestalt of operation of a vertical reverse arrangement type electrostatic-capacity type pressure sensor.

[Drawing 14] It is the manufacturing process view showing the packaging method of an one side mould type electrostatic-capacity type pressure sensor.

[Drawing 15] It is the manufacturing process view showing the packaging method of an one side mould type electrostatic-capacity type pressure sensor.

[Drawing 16] It is drawing showing the packaging structure of an one side mould type electrostatic-capacity type pressure sensor.

[Description of Notations]

S The main part of a sensor

P Resin package

1 Leadframe

2 Pressure-sensitive Chip

2a Diaphragm
3 Insulating Substrate
4 ***** (*****)
5 ***** Pinhole (*****)
6 Metal Plate
6a *****
7 Bonding Wire
8 Upper Surface ***** (*****)
8a Pipe section (*****)
8b Pipe
9 Inferior-Surface-of-Tongue ***** (*****)
9a Pipe section (*****)
9b Pipe
10 2nd Metal Plate
10a *****
11 Patchboard
11a *****
13 Bonding Wire
14 Leadframe
15 O Ring
80 Punch
81 Core Pin
90 Female Mold
91 Core Pin

[Translation done.]